

1. A device for retorting mercury bearing materials, comprising:

an oven for heating the materials to volatilize the mercury, condensing means for liquefying the resultant gaseous mercury, trap means for collecting liquid mercury outflowing from the condensing means, receptacle means for collecting the liquefied mercury from the trap, vacuum means maintaining trap, condensing means, oven and connecting passages at sub-atmospheric pressures and means scrubbing the finally condensed gaseous affluent to remove remnants of mercury therefrom; wherein

the oven, condensing means, mercury trap, and connecting passages are capable of operation in the range of internal pressures from 50 Torr to atmospheric with simultaneous internal oven temperatures in the range of 500 to 1500°F.

2. The retorting device of claim 1, wherein the oven comprises:

an oven body including:

a steel shell generally surrounding an internal space, having essentially closed bottom, top, side and rear portions and a substantially open front portion;

a rigid continuous frame continuously secured to the oven body shell all about the periphery of the open front portion thereof; and

an oven door for closing the open front portion of the oven body, said door comprising;

a steel shell door body;

a rigid frame continuously welded to the door body shell all about the periphery thereof; and

a seal member acting between the oven body and the door when the door is in oven-closing position.

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3. The retorting device of claim 2, wherein:

the oven front opening frame is continuously welded to a seal plate all around the front opening, the seal plate being continuously welded all around to the oven shell at the open front portion thereof, the seal plate carrying means for retaining the sealing member all around the front portion of the body of the oven; so that

the oven is sealed against entry of air thereinto when the door is secured to the open front portion of the oven body in contact with the sealing member retained all around the oven front opening.

4. The retorting device of claim 3, wherein:

the seal plate is welded to the outside surface of the oven shell, positioned rearwardly of the frontmost edge of said shell;

the seal plate carries projection means spaced outwardly from and all around the frontmost edge of the oven body; so that

the sealing member may be retained upon the seal plate between the projection means and the adjacent portion of the oven shell, the sealing member being of sufficient thickness for the rearmost portion of the door to bear sealingly thereagainst all around when the door is secured in oven closing position.

5. The retorting device of claim 4, wherein the door frame further comprises:

a continuous seal compressing member of lesser width than that of the sealing member, rearwardly projecting from the rearward face of the door frame all around, positioned and proportioned to everywhere bear against the sealing member when the door is secured to the open front portion of the oven body in oven closing position.

6. The retorting device of claim 3, wherein:

the frame about the open front portion of the oven comprises;

continuous tubular steel members with identical cross sections and mitred ends joined together by a continuous endless weld to form each corner juncture, said frame being continuously welded to the seal plate; and

the door body frame comprises;

continuous tubular steel members with identical cross sections and mitred ends joined together by a continuous endless weld to form each corner juncture, said frame being continuously welded to the periphery of the shell body of the door.

7. The retorting device of claim 6, wherein:  
the tubular members of the door body frame bear  
sealingly against the sealing member all around.

8. The retorting device of claim 6, wherein the door  
frame further comprises:

a continuous seal compressing member of lesser width  
than that of the sealing member, rearwardly projecting from  
the rearward face of the door frame all around, positioned  
and proportioned to everywhere bear against the sealing  
member when the door is secured to the open front portion of  
the oven body in oven closing position; wherein

the seal compressing member is carried by the tubular  
steel door frame members.

9. The retorting device of claim 8, wherein the oven  
further comprises:

hinge means connecting the oven door pivotally to the  
oven body frame; and

releasable, spring loaded tension members disposed  
about the periphery of the oven door, acting between the  
frame of the door and the frame of the open front portion of  
the oven body shell, for securing the door evenly against  
the sealing member.

10. The retorting device of claim 1, wherein the mercury trap thereof comprises:

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elongate tank means supported generally horizontally with a volatile oven effluent inlet end thereof elevated above an opposite, liquid mercury, outlet end;

water partially filling the tank means;

condenser means connected to the tank means above the water therein, so that condensate therefrom flows into the water;

means directing gaseous effluent from the oven through the condenser means; and

means for removing liquid mercury from the tank means from beneath the surface of the water while retaining other condensed materials.

11. The retorting device of claim 10, wherein the means for removing liquid mercury while retaining condensed materials other than mercury comprises:

dam means extending upwardly from the bottom of the tank means at the mercury outlet end thereof.

12. The retorting device of claim 11, wherein the condensing means comprises:

three condensers through which the gaseous effluent from the oven is serially directed.

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13. The retorting device of claim 12, wherein:  
the three condensers are vertically disposed, each having an inlet end and an opposite outlet end; and  
the means directing gaseous effluent from the oven comprises dam means extending downwardly from the top of the tank directing said effluent upwardly into a downwardly placed inlet end of one of the condensers, conduit means connecting the upwardly disposed outlet end of said condenser to an upwardly positioned inlet end of another of the condensers, the outlet end of which is placed to discharge effluent into the space above the water, to then enter the downwardly placed inlet of the remaining one of the three condensers, final uncondensed effluent being drawn from the upwardly disposed outlet end of said remaining condenser.

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14. The retorting device of claim 1, comprising:  
means for introducing a flow of ambient air into the oven to impel the mercury vapor into the trap and condensing means.

15. The retorting device of claim 14, wherein:  
the air flow inducing means includes means raising the ambient air temperature to oven internal temperature before flow thereof into the interior of the oven.

16. The retorting device of claim 15, wherein the flow inducing means comprises:

a metallic tube communicating between the interior of the oven and the ambient air, said tube being of sufficient length to permit the ambient air to be heated by conduction through the walls of the tube to oven interior temperature before emergence of the air from the tube into the interior of the oven.

17. The retorting device of claim 16, wherein:

the heated air emerges into the oven through spaced apart holes in the tube, so as to be distributed across the width of the bottom of the oven at the door end thereof.

18. The retorting device of claim 5, further comprising:

a metallic tube communicating between the interior of the oven and the ambient air, said tube being of sufficient length to permit the ambient air to be heated by conduction through the walls of the tube to oven interior temperature before emergence of the air from the tube into the interior of the oven; wherein

the heated air emerges into the oven through spaced apart holes in the tube, so as to be distributed across the width of the bottom of the oven at the door end thereof.

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19. The retorting device of claim 8, further comprising:

a metallic tube communicating between the interior of the oven and the ambient air, said tube being of sufficient length to permit the ambient air to be heated by conduction through the walls of the tube to oven interior temperature before emergence of the air from the tube into the interior of the oven; wherein

the heated air emerges into the oven through spaced apart holes in the tube, so as to be distributed across the width of the bottom of the oven at the door end thereof.

20. The retorting device of claim 17, wherein the mercury trap thereof comprises:

elongate tank means supported generally horizontally with a volatile oven effluent inlet end thereof elevated above an opposite, liquid mercury, outlet end;

water partially filling the tank means;

condenser means connected to the tank means above the water therein, so that condensate therefrom flows into the water;

means directing gaseous effluent from the oven through the condenser means; and

means for removing liquid mercury from the tank means from beneath the surface of the water while retaining other condensed materials, said liquid mercury removing means comprising dam means extending upwardly from the bottom of the tank means at the mercury outlet end thereof.

21. A trap for recovery of liquid mercury from gaseous mercury contained in the effluent from a mercury retorting device, said trap comprising:

elongate tank means supported generally horizontally with a volatile oven effluent inlet end thereof elevated above an opposite, liquid mercury, outlet end;

water partially filling the tank means;

condenser means connected to the tank means above the water therein, so that condensate therefrom flows into the water;

means directing gaseous effluent from the oven through the condenser means; and

means for removing liquid mercury from the tank means from beneath the surface of the water while retaining other condensed materials, said liquid mercury removing means comprising dam means extending upwardly from the bottom of the tank means at the mercury outlet end thereof.

22. The retorting device of claim 6, wherein:

the tubular steel members of the oven frame each carry longitudinally spaced apart nipples each communicating with the interior of the members, so that a flow of cooling air may be impelled through the hollow centers of said members; and

the tubular steel members of the door frame each carry longitudinally spaced apart nipples each communicating with the interior of the members, so that a flow of cooling air may be impelled through the hollow centers of said members.

23. The retorting device of claim 17, wherein:

the tubular steel members of the oven frame each carry longitudinally spaced apart nipples each communicating with the interior of the members, so that a flow of cooling air may be impelled through the hollow centers of said members; and

the tubular steel members of the door frame each carry longitudinally spaced apart nipples each communicating with the interior of the members, so that a flow of cooling air may be impelled through the hollow centers of said members.

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